☐ 1: Biophys J 1996 Nov;71(5):2591-601 Related Articles, Links

Molecular mobility in the monolayers of foam films stabilized by porcine lung surfactant.

Lalchev ZI, Todorov RK, Christova YT, Wilde PJ, Mackie AR, Clark DC.

Department of Biochemistry, Faculty of Biology, Sofia University, Bulgaria.

Certain physical properties of a range of foam film types that are believed to exist in vivo in the lung have been investigated. The contribution of different lung surfactant components found in porcine lung surfactant to molecular surface diffusion in the plane of foam films has been investigated for the first time. The influence of the type and thickness of black foam films, temperature, electrolyte concentration, and extract composition on surface diffusion has been studied using the fluorescence recovery after photobleaching technique. Fluorescent phospholipid probe molecules in foam films stabilized by porcine lung surfactant samples or their hydrophobic extracts consisting of surfactant lipids and hydrophobic lung surfactant proteins, SP-B and SP-C, exhibited more rapid diffusion than observed in films of its principal lipid component alone, L-alpha-phosphatidylcholine dipalmitoyl. This effect appears to be due to contributions from minor lipid components present in the total surfactant lipid extracts. The minor lipid components influence the surface diffusion in foam films both by their negative charge and by lowering the phase transition temperature of lung surfactant samples. In contrast, the presence of high concentrations of the hydrophillic surfactant protein A (SP-A) and non-lung-surfactant proteins in the sample reduced the diffusion coefficient (D) of the lipid analog in the adsorbed layer of the films. Hysteresis behavior of D was observed during temperature cycling, with the cooling curve lying above the heating curve. However, in cases where some surface molecular aggregation and surface heterogeneity were observed during cooling, the films became more rigid and molecules at the interfaces became immobilized. The thickness, size, capillary pressure, configuration, and composition of foam films of lung surfactant prepared in vitro support their investigation as realistic structural analogs of the surface films that exist in vivo in the lung. Compared to other models currently in use, foam films provide new opportunities for studying the properties and function of

physiologically important alveolar surface films.

PMID: 8913597 [PubMed - indexed for MEDLINE]
